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# QUESTIONS AND DISCUSSIONS.

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## NEW QUESTIONS.

**43.** Is any rapid special method known for the evaluation of the Sylvestrian determinant met with so often in elimination by the dialytic method? It would seem that there must be, both on account of its interesting shape, and of its frequent occurrence; yet no text that I am familiar with deals with this form in detail. Will some colleague who is a specialist in this field and knows the periodical literature give us some information on this matter?

**44.** Is there any known formula for the co-factor of the element $a_{ij}$ in the "binomial" determinant here shown?

$$\begin{vmatrix} 1 & 0 & 0 & \cdots & 0 & 0 \\ C_1^2 & 1 & 0 & \cdots & 0 & 0 \\ C_2^4 & C_1^4 & 1 & \cdots & 0 & 0 \\ \cdot\ \cdot & \cdot\ \cdot & \cdot\ \cdot & \cdot\ \cdot & \cdot\ \cdot & \cdot\ \cdot \\ \cdot\ \cdot & \cdot\ \cdot & \cdot\ \cdot & \cdot\ \cdot & \cdot\ \cdot & \cdot\ \cdot \\ C_{n+1}^{2n} & C_n^{2n} & C_{n-1}^{2n} & \cdots & C_1^{2n} & 1 \end{vmatrix}$$

Calling the co-factors $A_{ij}$, it is plain that $A_{ii} = 1$, and $A_{ij} = 0$, $(i > j)$. The co-factors of the zero elements, $(i < j)$, are undoubtedly expressible in a formula; the writer would like to know if any reader of the MONTHLY has met with such a formula anywhere.

## DISCUSSIONS.

Professor MacNeish shows how the intersections of two conic sections with given foci and directrices may be found by the use of ruler and compass, in case they have a focus in common. The problem reduces to special or to limiting cases of the problem of Apollonius.

Perpetual calendars have been discussed in the MONTHLY by Roman [*1915*, 241] and Morris [*1921*, 127]. Mr. Franklin calls attention in the second discussion below to a formula obtained by Zeller enabling one to calculate directly the day of the week on which any date will fall.

## I. THE INTERSECTIONS OF TWO CONIC SECTIONS WITH A COMMON FOCUS.

By H. F. MACNEISH, College of the City of New York.

The determination of the points of intersection of two conic sections having given foci and directrices is in general a problem of the fourth degree, and cannot be solved by ruler and compass. If, however, the two conics have a common focus the problem reduces to one of the second degree. The geometric solution